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PATENT APPLICATION

ATTORNEY DOCKET NO. 200208136-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Viredaz

Application No.: 10/632,311

Filing Date: July 30, 2003

Confirmation No.: 3682

Examiner: Lau, Tung S.

Group Art Unit: 2863

Title: METHOD AND SYSTEM FOR DYNAMICALLY CONTROLLING COOLING RESOURCES IN A DATA CENTER

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on May 9, 2007.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

☐ 1st Month $120	☐ 2nd Month $450	☐ 3rd Month $1020	☐ 4th Month $1590

☐ The extension fee has already been filed in this application.

☐ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of $ 500. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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☒ I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number (571)273-8300.
Date of facsimile: June 22, 2007
Typed Name: Wendell J. Jones
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Respectfully submitted,
Viredaz
By
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellant:	Viredaz	Examiner:	Lau, Tung S.
Serial No.:	10/632,311	Group Art Unit:	2863
Filed:	July 30, 2003	Docket No.:	200208136-1

Title: METHOD AND SYSTEM FOR DYNAMICALLY CONTROLLING COOLING RESOURCES IN A DATA CENTER

APPEAL BRIEF UNDER 37 C.F.R. §41.37

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

This Appeal Brief is submitted in support of the Notice of Appeal filed on May 9, 2007, appealing the final rejection of claims 1-6, 8-12, 14-19, 21-24, and 26-28 of the above-identified application as set forth in the Final Office Action mailed March 2, 2007.

The U.S. Patent and Trademark Office is hereby authorized to charge Deposit Account No. 08-2025 in the amount of $500.00 for filing a Brief in Support of an Appeal as set forth under 37 C.F.R. §41.20(b)(2). At any time during the pendency of this application, please charge any required fees or credit any overpayment to Deposit Account No. 08-2025.

Appellant respectfully requests consideration and reversal of the Examiner's rejection of pending claims 1-6, 8-12, 14-19, 21-24, and 26-28.

Appeal Brief to the Board of Patent Appeals and Interferences
Appellant: Viredaz
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Appeal Brief to the Board of Patent Appeals and Interferences
Appellant: Viredaz
Serial No.: 10/632,311
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Docket No.: 200208136-1
Title: METHOD AND SYSTEM FOR DYNAMICALLY CONTROLLING COOLING RESOURCES IN A DATA CENTER

REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant that will have a bearing on the Board's decision in the present Appeal.

STATUS OF CLAIMS

In a Final Office Action mailed December 6, 2006, claims 1-6, 8-12, 14-19, 21-24, and 26-28 were finally rejected. Claims 7, 13, 20, 25 and 29 were objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Claims 1-29 are pending in the application, and are the subject of the present Appeal.

STATUS OF AMENDMENTS

No amendments have been entered subsequent to the Final Office Action mailed May 10, 2007. No Response After Final was filed and no amendments to the claims were proposed by Appellants or entered by the Examiner.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The Summary is set forth as an exemplary embodiment as the language corresponding to independent claims 1, 8, 14, 21 and 26. Discussions about elements of claims 1, 8, 14, 21 and 26 can be found at least at the cited locations in the specification and drawings.

The present invention, as claimed in independent claim 1, provides a method for dynamically controlling cooling systems in a data center comprising determining a workload within the data center, determining an amount of heat being generated as a function of the workload and activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated (See, e.g., specification at page 6, lines 18-25; Figure 1; reference numbers 110, 120 and 130).

The present invention, as claimed in independent claim 8, provides a system for dynamically controlling cooling systems in a data center comprising means for determining a workload within the data center, means for determining an amount of heat being generated as a function of the workload and means for activating each of a plurality of different types of cooling systems coupled within the data center in an optimal fashion based on the amount of heat being generated. (See, e.g., specification at page 7, lines 11-31; Figure 2; reference numbers 210-213, 220, 230-233).

The present invention, as claimed in independent claim 14, provides a data center comprising a global computer system, a plurality of different cooling systems coupled to the global computer system and a cooling system control module coupled to the global computer system and the plurality of different cooling systems wherein the cooling system control module includes logic for determining a workload within the global computer system determining an amount of heat being generated as a function of the workload and activating each of a plurality of different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated. (See, e.g., specification at page 7, lines 11-31; Figure 2; reference numbers 210-213, 220, 230-233).

The present invention, as claimed in independent claim 21, provides a computer program product for dynamically controlling cooling systems in a global computer system, the computer program product comprising a computer usable medium having computer readable program means for causing a computer to perform the steps of determining a workload within the global computer system, determining an amount of heat being generated as a function of the workload and activating each of a plurality of

different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated. (See, e.g., specification at page 6, line 26 – page 7, line 11).

The present invention, as claimed in independent claim 26, provides cooling system control module for a data center comprising determination logic for determining a workload within the data center and determining an amount of heat being generated as a function of the workload and activation logic for activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the amount of heat being generated. (See, e.g., specification at page 11, line 6 – page 13, line 6, Figure 5; reference numbers 21, 220-224, 230).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

i. **Claims 1-6, 8-12, 14-19, 21-24 and 26-28 stand rejected under 35 USC §102(e) as being anticipated by Patel et al. (US 2004/0264124).**

ARGUMENT

I. The Applicable Law

35 U.S.C. §102

We respectfully remind the Examiner that in order to anticipate a claim, the cited prior must teach **every element of the claim** and "***the identical invention must be shown in as complete detail as contained in the ... claim.***" *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989) (Emphasis added).

II. Rejection of Claims 1-6, 8-12, 14-19, 21-24 and 26-28 stand rejected under 35 USC §102(e) as being anticipated by Patel et al. (US 2004/0264124).

The Examiner rejected claims 1-6, 8-12, 14-19, 21-24 and 26-28 under 35 U.S.C. §102(e) as being anticipated by Patel et al. (US 2004/0264124). Appellants respectfully submit that *Patel et al.* does not teach or suggest the invention of independent claims 1, 8, 14, 21 and 26, and the claims depending therefrom. Specifically, *Patel et al.* doesn't teach or suggest ***activating each of a plurality of different types of cooling systems within a data center in an optimal fashion*** as recited in the independent claims independent claims 1, 8, 14, 21 and 26 of the present invention.

The present invention includes a method and system for dynamically controlling cooling resources in a data center. The present invention dynamically controls a plurality of different types of cooling systems within a data center based on the workload constraints (power consumed, latency, etc.) of the data center. Accordingly, each of the plurality of different types of cooling system is activated in an optimal fashion based on the workload constraints. As a result of the use of the method and system in accordance with embodiments of the present invention, a substantial savings in operational costs related to cooling systems is achieved.

The Examiner states that the Patel reference anticipates the present invention. Applicant respectfully disagrees and asserts that the Patel reference does not disclose ***activating each of a plurality of different types of cooling systems within a data center in an optimal fashion*** based on the heat being generated as recited in independent claims 1, 8, 14, 21 and 26 of the present invention. Patel discloses a cooling system for cooling computer systems detects heat dissipated by the computer systems. If the heat dissipated by the computer systems exceeds a threshold, at least one component of the computer systems is placed in a lower-power state to reduce heat dissipation. Applicant asserts that Patel reference only relates to the cooling of the components of individual computers. ***Patel does not teach or suggest the step of activating each of a plurality of different types of cooling systems within a data***

center in an optimal fashion based on the heat being generated. The Examiner stipulates that Patel teaches this step in paragraph 26. Paragraph 26 of Patel reads:

> The cooling system is operable to maintain the temperatures of components of the computer systems within predetermined ranges when the computer systems are dissipating the nominal amount of heat. By designing cooling systems based on nominal heat dissipation rather than maximum heat dissipation, generally, more efficient and cost effective cooling systems may be used. For example, smaller fans or less complicated coolant systems may be used, because a smaller amount of heat is being removed. Also, significantly less energy may be required to power the cooling system based on nominal heat dissipation. For example, a computer system may have a nominal heat dissipation of 200 Watts (W) and a maximum heat dissipation of 350 W. Significantly more energy is required to cool the computer system dissipating 350 W rather than 200 W, especially when multiple computer systems are being cooled. As an approximation, the energy needed to cool a computer system (e.g., power used by a blower) is generally 10% of the amount of heat being dissipated by the computer system (e.g., 35 W of energy to cool 350 W of heat dissipation and 20 W to cool 200 W of heat dissipation). Based on this example, a power savings of 15 W (approximately 43%) is achieved per computer when a fixed velocity component (e.g., blower or a fan) is used.

Applicant fails to see how this paragraph demonstrates the step of activating each of a plurality of different types of cooling system within the data center in an optimal fashion based on the heat being generated as recited in the present invention. The cooling system of the present invention includes a plurality of different types of cooling systems. For example, in an embodiment of the present invention, a first type of cooling system is an air-based cooling system, a second type of cooling system is a liquid-based cooling system and a third type of cooling system is a gas-based cooling system. ***The Patel reference does not disclose the implementation of a plurality of different cooling systems as recited in the independent claims of the present invention.***

Furthermore, claim 2 recites an embodiment whereby the optimal fashion is based on a cost associated with the activation of each of the plurality of different cooling systems. ***Patel does not teach or suggest an optimal fashion based on a cost associated with the activation of each of the plurality of different cooling systems.*** The Examiner stipulates that Patel teaches this step in paragraph 33. Paragraph 33 is shown above.

Although Patel discloses cooling optimization to minimize energy utilization, Applicant fails to see how this paragraph demonstrates that an optimal fashion of activating each of a plurality of different cooling systems is based on a cost associated with the activation of each of the plurality of different cooling systems.

Consequently, since the Patel reference does not disclose the implementation of a plurality of different cooling systems, Patel does not disclose the step of activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated as recited in the independent claims of the present invention. Accordingly, independent claims 1, 8, 14, 21 and 26 of the present invention are allowable over the Patel reference.

Claims 2-6, 9-12, 15-19, 22-24 and 27-28

Since claims 2-6, 9-12, 15-19, 22-24 and 27-28 are respectively dependent on claims 1, 8, 14, 21 and 26, the above-articulated arguments with regard to independent claims 1, 8, 14, 21 and 26 apply with equal force to claims 2-4, 6, 9-10, 22-24 and 27-28. Accordingly, claims 2-4, 6, 9-10, 22-24 and 27-28 should be allowed over the Examiner's cited reference.

CONCLUSION

For the above reasons, Appellants respectfully submit that the cited references neither anticipate nor render obvious claims of the pending Application. The pending claims distinguish over the cited references, and therefore, Appellants respectfully submit that the rejections must be withdrawn, and respectfully request the Examiner be reversed and claims 1-6, 8-12, 14-19, 21-24, and 26-28 be allowed.

Any inquiry regarding this Response should be directed to Wendell J. Jones at Telephone No. (408) 938-0980. In addition, all correspondence should continue to be directed to the following address:

IP Administration
Legal Department, M/S 35
HEWLETT-PACKARD COMPANY
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Respectfully submitted,
Viredaz et al.
By their attorney,
Wendell J. Jones

Date: 6/22/07

Wendell J. Jones
Reg. No. 45,961

CLAIMS APPENDIX

1. (Previously amended) A method for dynamically controlling cooling systems in a data center comprising:

determining a workload within the data center;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the heat being generated.

2. (Previously Amended) The method of claim 1 wherein the optimal fashion is based on a cost associated with the activation of each of the plurality of different cooling systems.

3. (Previously Amended) The method of claim 1 wherein the method further comprises:

deactivating one or more of the activated plurality of different types of cooling systems within the data center based on a reduction in the amount of power being consumed by the workload.

4. (Original) The method of claim 1 wherein the amount of heat being generated is a function of an amount of power being consumed by the data center.

5. (Previously Amended) The method of claim 4 wherein each of the plurality of cooling systems has a cooling capability wherein the cooling capability is a function of an amount of heat that can be removed by the cooling system and the act of activating each of a plurality of different cooling systems in an optimal fashion further comprises:

activating each of a plurality of different cooling systems based on the amount of heat that can be removed by each of the plurality of cooling systems.

6. (Previously Amended) The method of claim 1 wherein the plurality of cooling systems comprises an air-based cooling system, a liquid-based cooling system and a gas-based cooling system.

7. (Previously Amended) The method of claim 6 wherein the act of activating each of a plurality of different cooling systems within the data center in an optimal fashion further comprises:

activating the air-based cooling system before the liquid-based cooling system and the gas-based cooling system; and

activating the liquid-based cooling system before the gas-based cooling system.

8. (Previously Amended) A system for dynamically controlling cooling systems in a data center comprising:

means for determining a workload within the data center;

means for determining an amount of heat being generated as a function of the workload; and

means for activating each of a plurality of different types of cooling systems coupled within the data center in an optimal fashion based on the amount of heat being generated.

9. (Previously Amended) The system of claim 8 wherein the method further comprises:

means for deactivating one or more of the activated plurality of different types of cooling systems within the data center based on a reduction in the amount of heat being generated.

10. (Original) The system of claim 8 wherein the amount of heat being generated is a function of an amount of power being consumed by the data center.

11. (Previously Amended) The system of claim 10 wherein each of the plurality of cooling systems has a cooling capability wherein the cooling capability is a function of an amount of heat that can be removed by the cooling system and the means for activating each of a plurality of different cooling systems in an optimal fashion further comprises:

means for activating each of a plurality of different cooling systems based on the amount of heat that can be removed by each of the plurality of cooling systems.

12. (Previously Amended) The system of claim 11 wherein the plurality of cooling systems comprises an air-based cooling system, a liquid-based cooling system and a gas-based cooling system.

13. (Previously Amended) The system of claim 12 wherein the means for activating each of a plurality of different cooling systems within the data center in an optimal fashion further comprises:

means for activating the air based cooling system before the liquid based cooling system and the gas based cooling system; and

means for activating the liquid based cooling system before the gas based cooling system.

14. (Previously Amended) A data center comprising:

a global computer system;

a plurality of different cooling systems coupled to the global computer system; and

a cooling system control module coupled to the global computer system and the plurality of different cooling system wherein the cooling system control module includes logic for:

determining a workload within the global computer system;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

15. (Previously Amended) The data center of claim 14 wherein the optimal fashion is based on a cost associated with the activation of each of the plurality of different cooling systems.

16. (Previously Amended) The data center of claim 14 wherein the cooling system control module further comprises logic for:

deactivating one or more of the activated plurality of different types of cooling systems within the data center based on a reduction in the amount of heat being generated.

17. (Original) The data center of claim 14 wherein an amount of heat being dissipated by the global computer system is a function of an amount of power being consumed by the global computer system.

18. (Previously Amended) The data center of claim 17 wherein each of the plurality of cooling systems has a cooling capability wherein the cooling capability is a function of an amount of heat that can be removed by the cooling system and the logic for activating each of a plurality of different cooling systems in an optimal fashion further comprises logic for:

activating each of a plurality of different cooling systems based on the amount of heat that can be removed by each of the plurality of cooling systems.

19. (Previously Amended) The data center of claim 14 wherein the plurality of cooling systems comprises an air-based cooling system, a liquid-based cooling system and a gas-based cooling system.

20. (Previously Amended) The data center of claim 19 wherein the logic for activating each of a plurality of different cooling systems coupled to the global computer system in an optimal fashion further comprises logic for:

activating the air based cooling system before the liquid based cooling system and the gas based cooling system; and

activating the liquid based cooling system before the gas based cooling system.

21. (Previously Amended) A computer program product for dynamically controlling cooling systems in a global computer system, the computer program product comprising a computer usable medium having computer readable program means for causing a computer to perform the steps of:

determining a workload within the global computer system;

determining an amount of heat being generated as a function of the workload; and

activating each of a plurality of different types of cooling systems coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

22. (Previously Amended) The computer program product of claim 21 wherein the optimal fashion is based on a cost associated with the activation of each of the plurality of different cooling systems.

23. (Previously Amended) The computer program product of claim 21 further comprising means for causing a computer to perform the step of:

deactivating one or more of the activated plurality of different types of cooling systems within the data center based on a reduction in the amount of heat being generated.

24. (Previously Amended) The computer program product of claim 21 wherein the plurality of cooling systems comprises an air-based cooling system, a liquid-based

cooling system and a gas-based cooling system.

25. (Previously Amended) The computer program product of claim 21 wherein the step of activating each of a plurality of different cooling systems coupled to the global computer system in an optimal fashion further comprises:

activating the air-based cooling system before the liquid-based cooling system and the gas-based cooling system; and

activating the liquid-based cooling system before the gas-based cooling system.

26. (Previously Amended) A cooling system control module for a data center comprising:

determination logic for:

determining a workload within the data center; and

determining an amount of heat being generated as a function of the workload; and

activation logic for activating each of a plurality of different types of cooling systems within the data center in an optimal fashion based on the amount of heat being generated.

27. (Previously Amended) The cooling system control module of claim 26 further comprising logic for:

deactivating one or more of the activated plurality of different types of cooling systems within the data center based on a reduction in the amount of heat being generated.

28. (Previously Amended) The cooling system control module of claim 26 wherein the plurality of different types of cooling systems comprise an air-based cooling system, a liquid-based cooling system and a gas-based cooling system.

29. (Previously Amended) The cooling system control module of claim 28 wherein the logic for activating each of a plurality of different types of cooling systems within the data center in an optimal fashion further comprises logic for:

activating the air-based cooling system before the liquid-based cooling system and the gas-based cooling system; and

activating the liquid-based cooling system before the gas-based cooling system.

Appeal Brief to the Board of Patent Appeals and Interferences
Appellant: Viredaz
Serial No.: 10/632,311
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EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.